

Appl. No. 10/067,185
Amdt. dated Oct. 29, 2003
Reply to Office action of September 29, 2003

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (previously presented): An agricultural inoculum suitable for inoculating plant seeds, said inoculum comprising:

- a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof;
- a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof; and
- a suitable carrier that is non-phytotoxic, non-bacteriostatic, and non-bacteriocidal.

Claim 2 (previously presented): A composition of matter comprising:

- a plant seed inoculated with a combination comprising a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof and a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof;
- wherein said combination suppresses growth of plant pathogenic fungi.

Claim 3 (previously presented): A plant inoculated with a combination comprising:

a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof; and

a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof;

wherein the combination suppresses growth of plant pathogenic fungi and the plant is selected from the group consisting of

corn,

sunflower,

soybean,

field pea, and

wheat.

Claim 4 (previously presented): A method of protecting a plant from disease caused by a plant pathogenic fungus comprising:

inoculating seeds from said plant with a combination comprising a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof and a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof;

wherein said combination suppresses growth of plant pathogenic fungi.

Claim 5 (previously presented): A method of protecting a seed or a plant from disease caused by a plant pathogenic fungus comprising:

inoculating seeds from said plant with a composition comprising a spore-forming fungal antagonist and a spore-forming bacterial antagonist.

Claim 6 (previously presented): The method of claim 5 wherein the spore-forming bacterial antagonist is selected from the group *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof.

Claim 7 (currently amended): A method of protecting a seed or a plant from disease caused by a plant pathogenic fungus comprising:

inoculating seeds from said plant with a composition comprising ~~a fungal antagonist and a bacterial antagonist~~ the agricultural antagonist of claim 1;

wherein said combination suppresses growth of plant pathogenic fungi.

Claim 8 (previously presented): The method of claim 7 wherein the combination suppresses growth of the plant pathogen fungi *Fusarium*, *Phythium*, *Phytophthora* and *Penicillium*.

Claim 9 (previously presented): A method of protecting a plant from disease caused by a plant pathogenic fungus comprising:

inoculating seeds from said plant with a composition comprising a fungal antagonist and a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof;

wherein said combination suppresses growth of plant pathogenic fungi.

Claim 10 (previously presented): A method for biologically controlling or inhibiting stalk rot or root rot comprising:

coating seeds with an effective amount of a composition comprising *Trichoderma virens* GL-3 (ATCC 58678) and *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390).

Claim 11 (previously presented): A process for making a composition comprising:

introducing an essentially pure culture of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) to a growth medium about eight hours after an essentially pure culture of *Trichoderma virens* GL-3 (ATCC 58678) is introduced to the growth medium; and
growing the culture as a competitive culture.

Claim 12 (previously presented): A process comprising making a composition comprising:

combining an essentially pure culture of *Trichoderma virens* GL-3 (ATCC 58678) with an essentially pure culture of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) in a 50:50 mixture; and
applying said composition to a seed at a rate of at least 100,000 spores per seed.

Claim 13 (previously presented): A method for protecting plants in a growing medium from damping off and root rot fungal plant disease comprising:

placing in the growing medium in the immediate vicinity of the plant to be protected an effective quantity of the agricultural inoculum of claim 1.

Claim 14 (currently amended): A method for protecting plants from fungal plant disease comprising:

adding the composition of claim 2 1 in an effective quantity to a substrate selected from the group consisting of pelletized calcium sulfate or pelletized lime; and
placing the pellet in the immediate vicinity of the plant to be protected.

Claim 15 (previously presented): The method of claim 14 further comprising:

adding another plant growth nutrient to the pellet.

Claim 16 (previously presented): A method for protecting a plant from fungal plant disease comprising:

adding the agricultural inoculum of claim 1 in an effective quantity to a liquid solution;
and
applying the liquid solution in the immediate vicinity of the plant.

Claim 17 (previously presented): The method of claim 16 further comprising:

adding an additive to the liquid, said additive being at least one substance selected from the group consisting of

a plant nutrient,

a plant micro-nutrient, and

a chemical fungicide.

Claim 18 (currently amended): A method for biologically controlling a plant disease caused by a plant-colonizing fungus, the method comprising:

inoculating a seed of the plant with an effective amount of a microbial inoculant comprising a combination of microorganisms having all of the identifying characteristics of *Trichoderma virens* G1-3 (ATCC 58678) and *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) the agricultural inoculum of claim 1, said inoculation resulting in the control of said plant disease.

Claim 19 (previously presented): The method of claim 18 wherein said inoculation results in the control of more than one plant disease.

Claim 20 (currently amended): A method comprising:

combining of a spore-forming fungal strain and a spore-forming bacterial strain to produce a product; whereby the combining step enhances ease of use and longevity of the product.

Claim 21 (previously presented): A method comprising:

applying a *Trichoderma* spp. microorganism and a *Bacillus* spp. microorganism to a wettable powder to produce a combination; and
applying the combination to a seed.

Claim 22 (previously presented): A composition of matter made by combining:

a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof;

a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof; and

a suitable carrier that is non-phytotoxic, non-bacteriostatic, and non-bacteriocidal.

Claim 23 (previously presented): An antagonist for controlling plant pathogens made by combining effective amounts of:

a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof;

a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof; and

a suitable carrier that is non-phytotoxic, non-bacteriostatic, and non-bacteriocidal.

Claim 24 (previously presented): An antagonist made by further combining with the antagonist of claim 23 an effective amount of another bacterial strain.

Claim 25 (previously presented): A seed assembly made by combining a plant seed with effective amounts of a spore-forming bacterial antagonist and a spore-forming fungal antagonist.

Claim 26 (previously presented): The seed assembly of claim 25 wherein the seed is a seed of a plant selected from the group consisting of

a monocot, and

a dicot.

Claim 27 (previously presented): The seed assembly of claim 25 wherein the seed is a seed of a plant selected from the group consisting of

a legume plant, and

a non-legume plant.

Claim 28 (previously presented): The seed assembly of claim 25 wherein the seed is a seed of a plant selected from the group consisting of

corn,

sunflower,

soybean,

field pea, and

wheat.

Claim 29 (previously presented): A method for culturing a plant comprising:

applying the antagonist of claim 23 to a seed or to the seedbed of the plant;

planting the seed in the seedbed;

growing the plant to yield a crop; and

harvesting the crop;

wherein said applying step increases the yield of the crop.

Claim 30 (previously presented): The method of claim 29 wherein the antagonist is applied to the seed or to the seedbed of a plant selected from the group consisting of

a monocot, and
a dicot.

Claim 31 (previously presented): The method of claim 29 wherein the antagonist is applied to the seed or to the seedbed of a plant selected from the group consisting of

a legume plant, and
a non-legume plant.

Claim 32 (previously presented): The method of claim 29 wherein the antagonist is applied to the seed or to the seedbed of a plant selected from the group consisting of

corn,
sunflower,
soybean,
field pea, and
wheat.

Claim 33 (previously presented): A process comprising:

making a composition by combining an essentially pure culture of *Trichoderma virens* GL-3 (ATCC 58678) with an essentially pure culture of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) in a mixture; and

applying said composition to a seed; wherein said mixture ranges in composition from 10 to 90 percent *Trichoderma virens* GL-3 (ATCC 58678) by culture volume and from 90 to 10 percent *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) by culture volume.

Claim 34 (previously presented): A process comprising:

making a composition by combining an essentially pure culture of *Trichoderma virens* GL-3 (ATCC 58678) with a plurality of essentially pure cultures of bacteria in a mixture; and
applying said composition to a seed; wherein said mixture ranges in composition from 10 to 90 percent *Trichoderma virens* GL-3 (ATCC 58678) by culture volume.

Claim 35 (previously presented): An antagonist for controlling plant pathogens made by combining effective amounts of:

a fungal antagonist selected from the group consisting of a strain of *Trichoderma virens* and mutants thereof;

a bacterial antagonist selected from the group consisting of *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) and mutants thereof; and

a suitable carrier that is non-phytotoxic, non-bacteriostatic, and non-bacteriocidal.

Claim 36 (previously presented): The antagonist of claim 35 wherein the strain is *Trichoderma viren* Gl 21.

Claim 37 (previously presented): An antagonist for controlling plant pathogens made by combining effective amounts of:

a fungal antagonist selected from the group consisting of *Trichoderma virens* GL-3 (ATCC 58678) and mutants thereof;

a plurality of bacterial antagonists; and

a suitable carrier that is non-phytotoxic, non-bacteriostatic, and non-bacteriocidal.

Claim 38 (previously presented): The antagonist of claim 37 wherein the plurality of bacterial antagonists comprises a strain of *Erwinia carotovora*.

Claim 39 (previously presented): The antagonist of claim 37 wherein the plurality of bacterial antagonists comprises a strain of *Bacillus lentimorbus*.

Claim 40 (new): A method comprising:

combining a spore-forming fungal strain and a spore-forming bacterial strain to produce a product comprising the composition of matter of claim 22; and

applying the product to a plant;

whereby application of the product produces yield enhancement in the plant.

Claim 41 (new): A method comprising:

applying a *Trichoderma* spp. microorganism and a *Bacillus* spp. microorganism to a wettable powder to produce a combination comprising the antagonist of claim 23; and

applying the combination to a seed;

whereby application of the combination produces a positive yield response in a plant growing from the seed.

Claim 42 (new): A process comprising:

making the agricultural inoculum of claim 1; and

applying said agricultural inoculum to a seed;

wherein said agricultural inoculum ranges in composition from 1 to 99 percent

Trichoderma virens GL-3 (ATCC 58678) by culture volume and from 99 to 1 percent *Bacillus amyloliquefaciens* TJ1000 or 1BE (ATCC BAA-390) by culture volume.

Claim 43 (new): A composition of matter comprising:

a plant seed inoculated with the agricultural inoculum of claim 1;

wherein said combination increases the yield of the plant.

Claim 44 (new): A method for increasing the yield of a plant, the method comprising:

coating a seed of the plant with an effective amount of the agricultural inoculum of claim 1; and

culturing the plant.